Genome, Epigenome, and Environment Determine the Set of All Possible Motivated Behaviors.

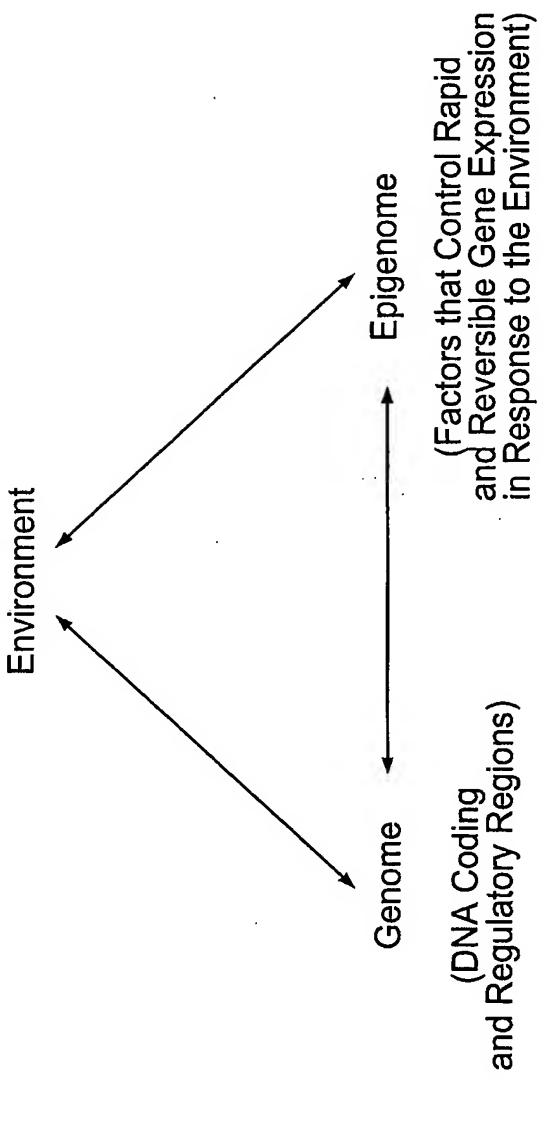
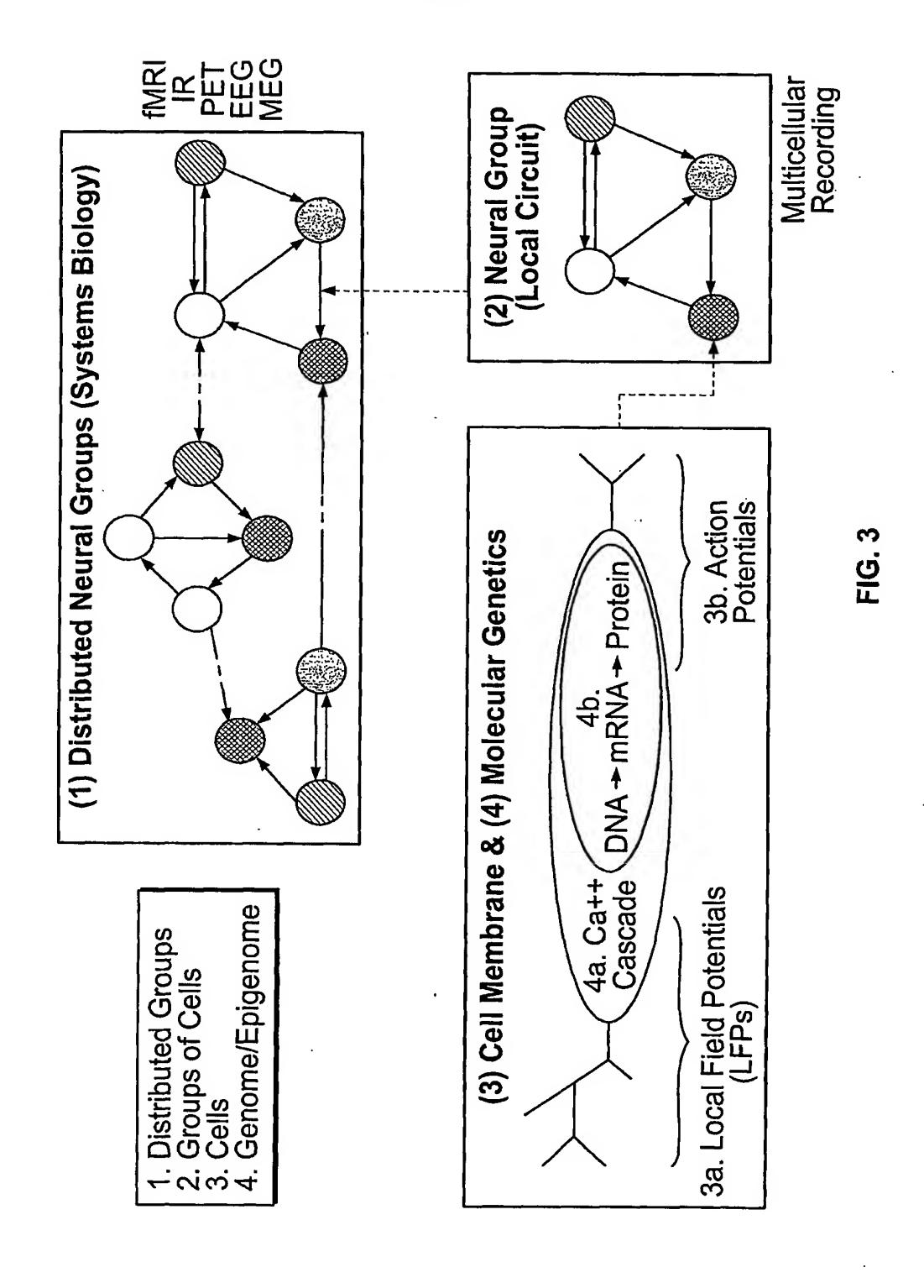
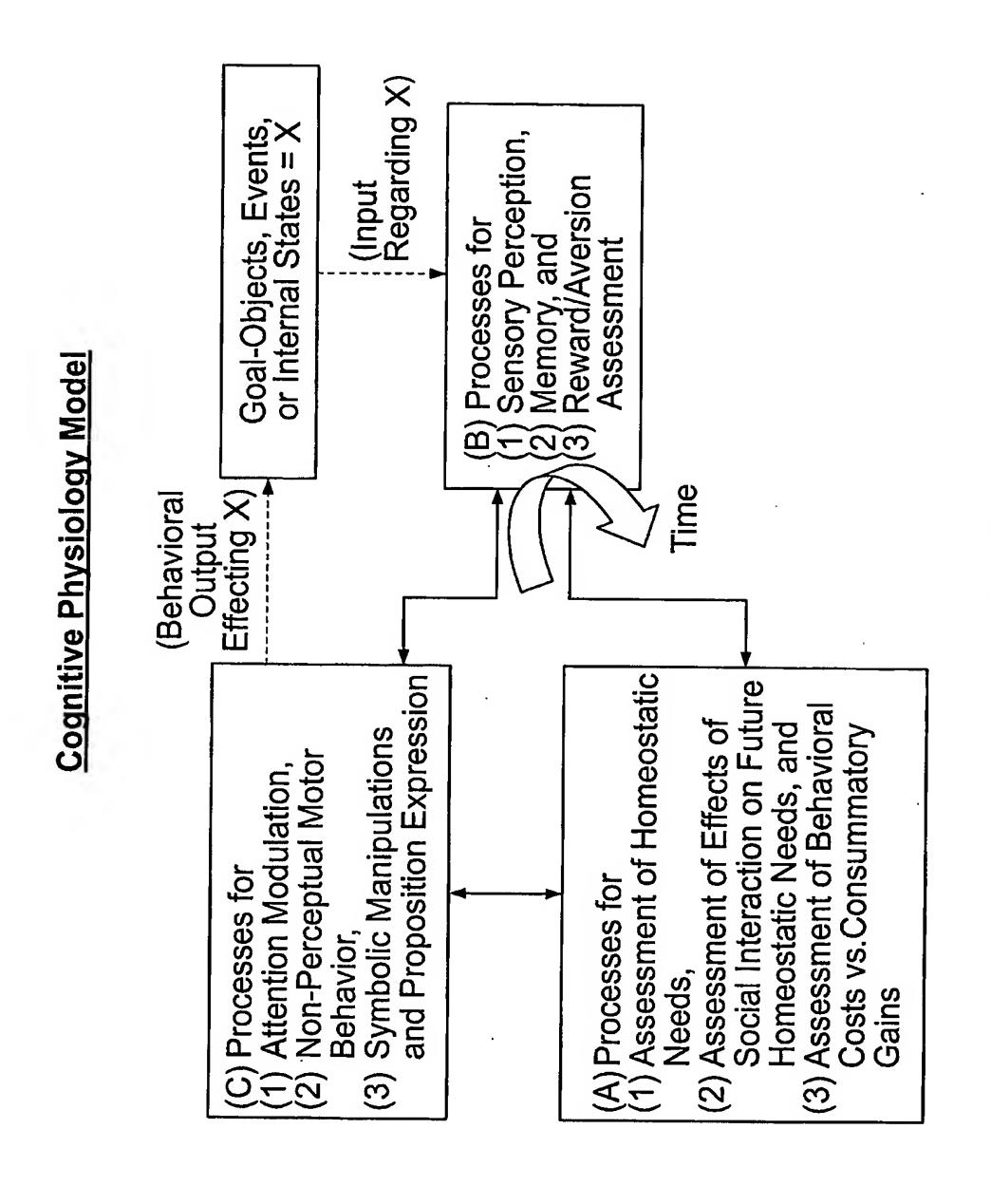


FIG. 1

Environment Epigenome Systems Biology Acts as an Interface Between the Environment and Genome/Epigenome. Distributed/Groups **Groups of Cells** Behavior Genome Cells Systems Biology

FIG. 2





-16. 4A

## **Communication Theory Model**

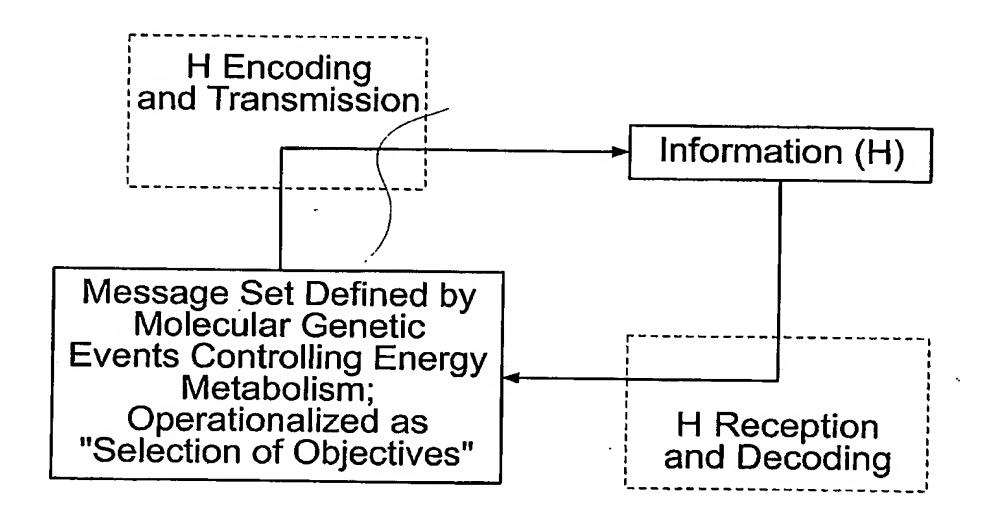
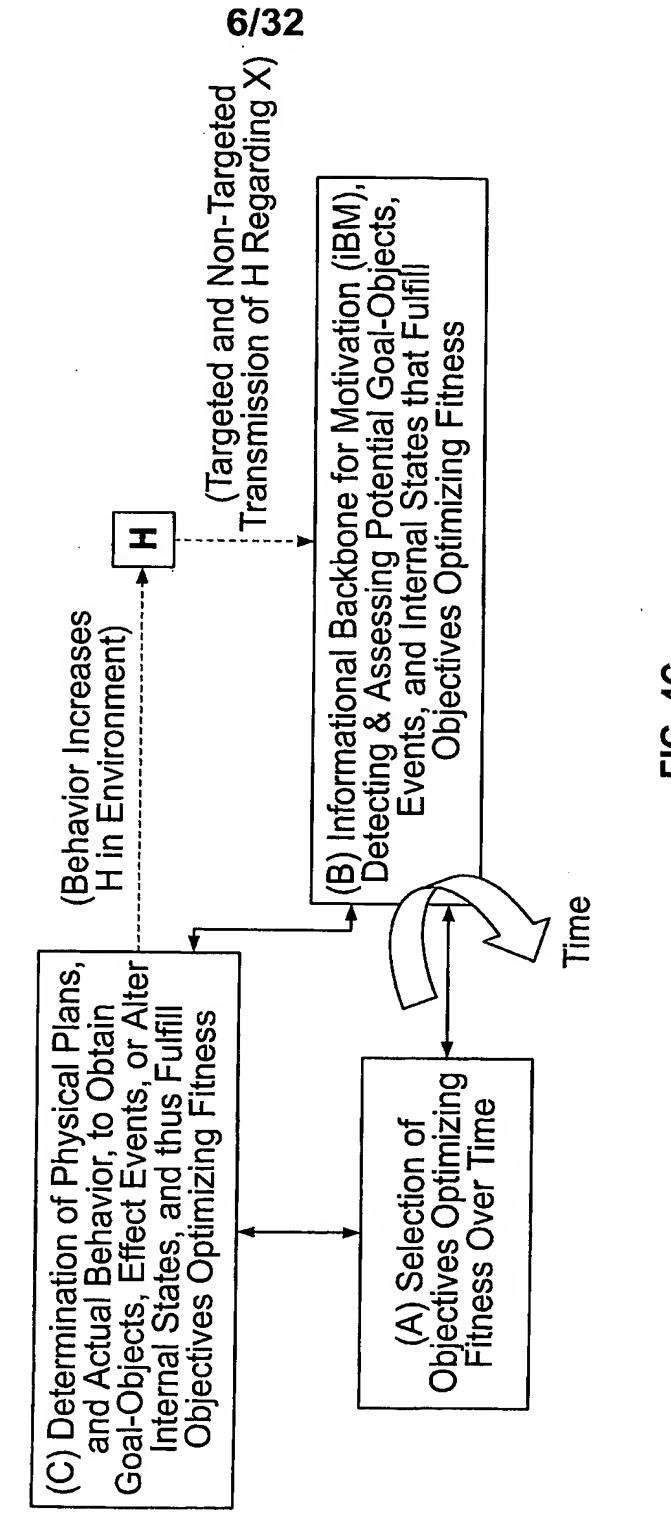


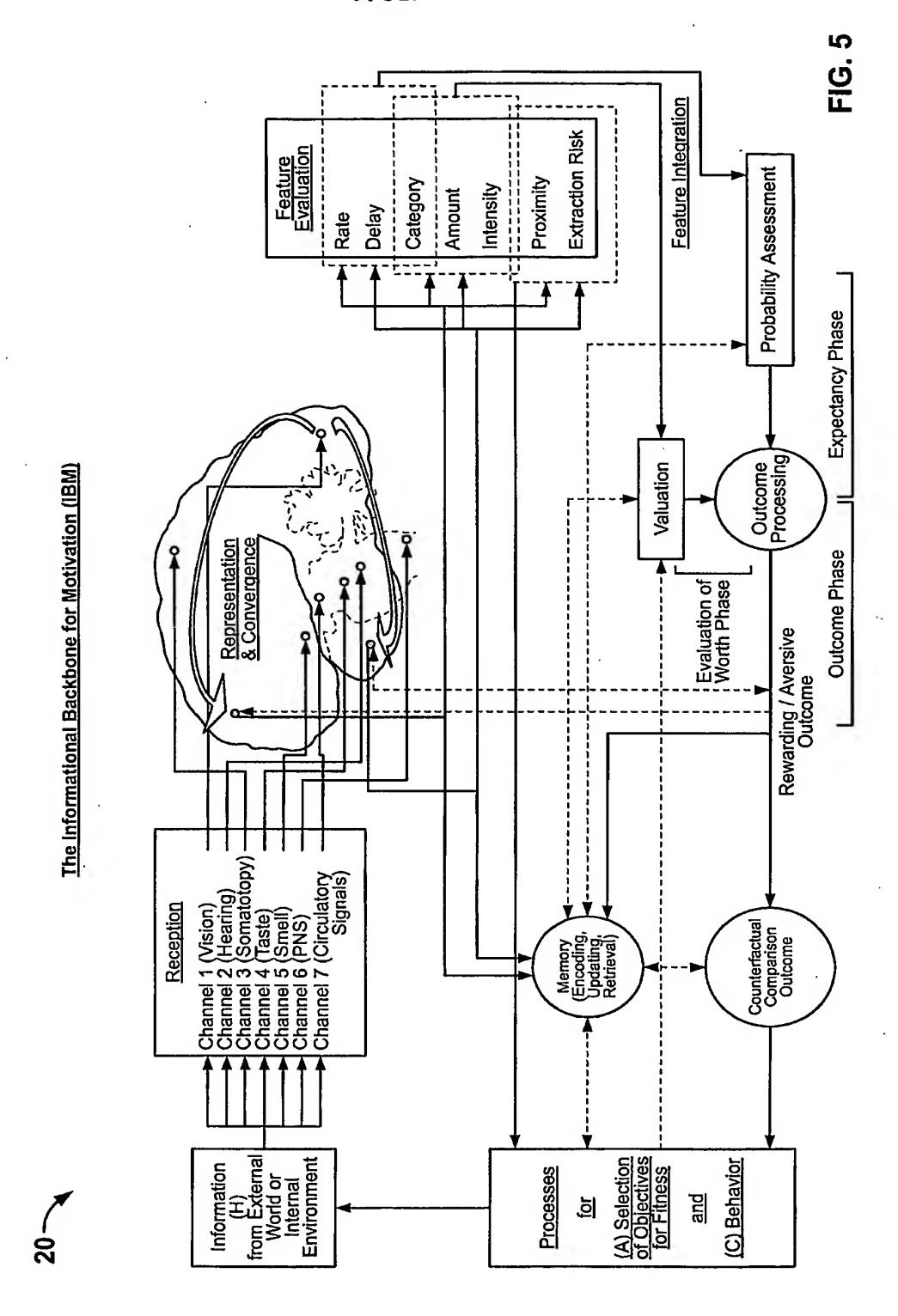
FIG. 4B





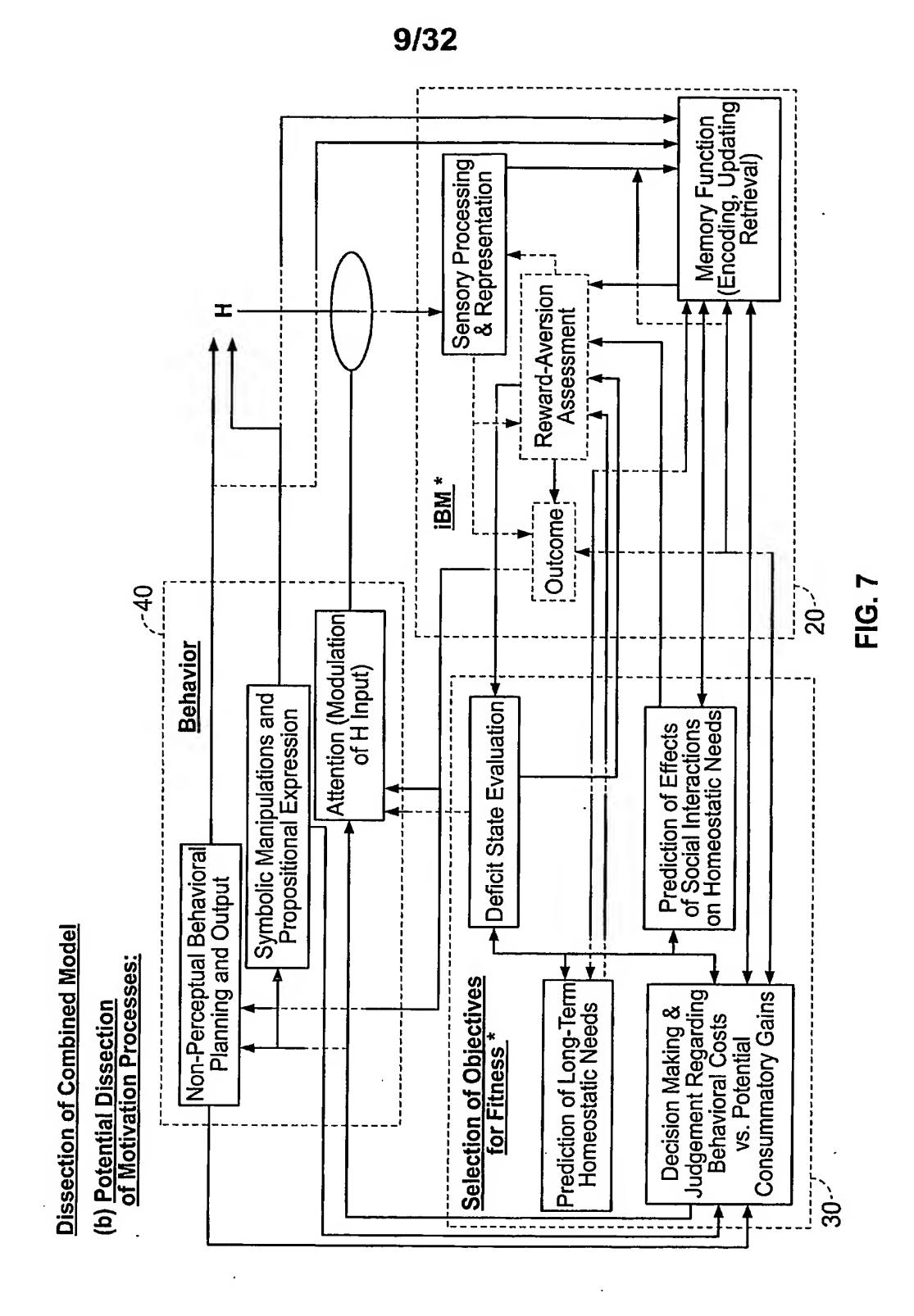
.6. 4C

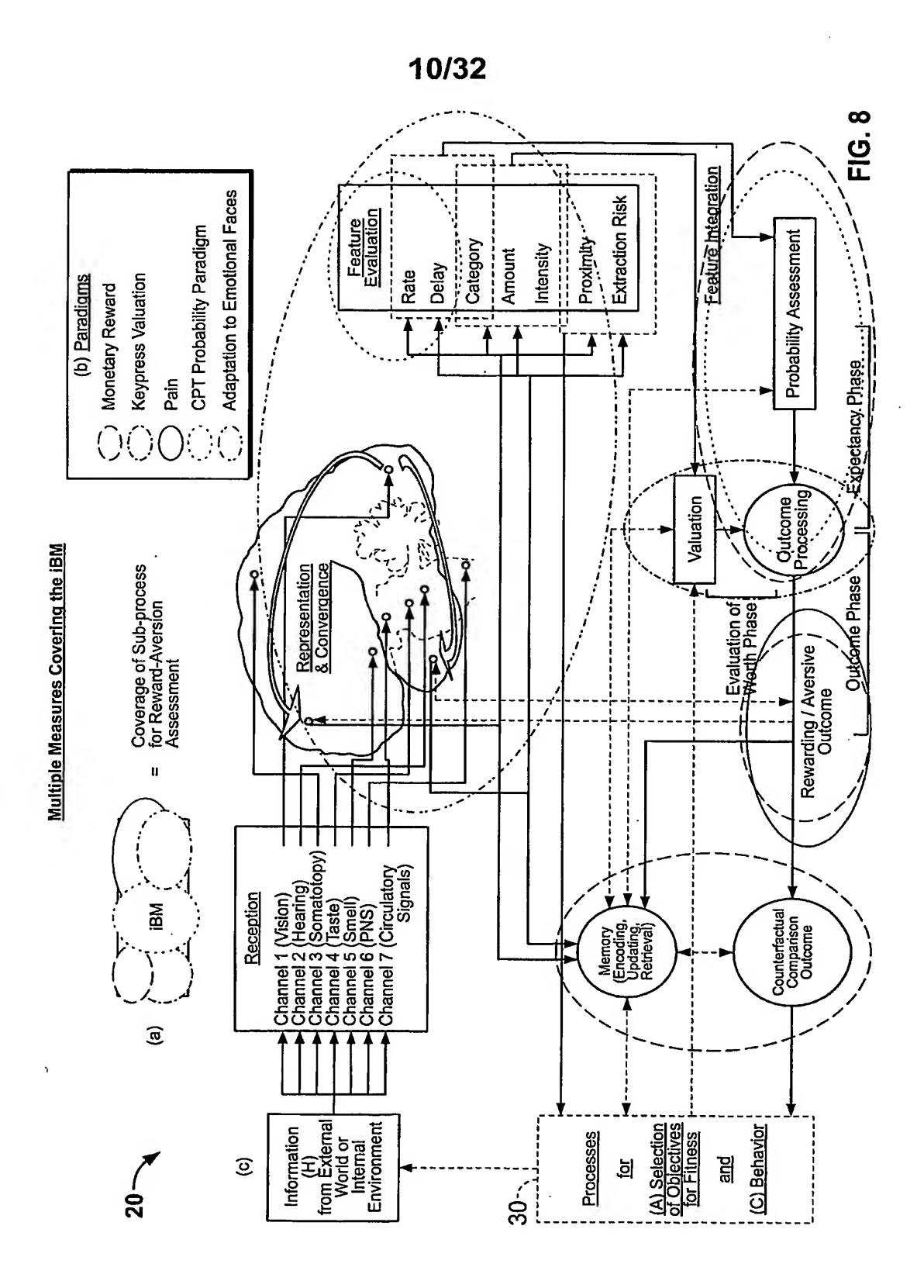
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Informational Backbone for Motivation (iBM) Dissection of Combined Model
(a) Combined Model for Motivation: Time Determination of Physical Plans to Fulfill Objectives, and Behavior Selection of Objectives Optimizing Fitness Over Time

FIG. 6







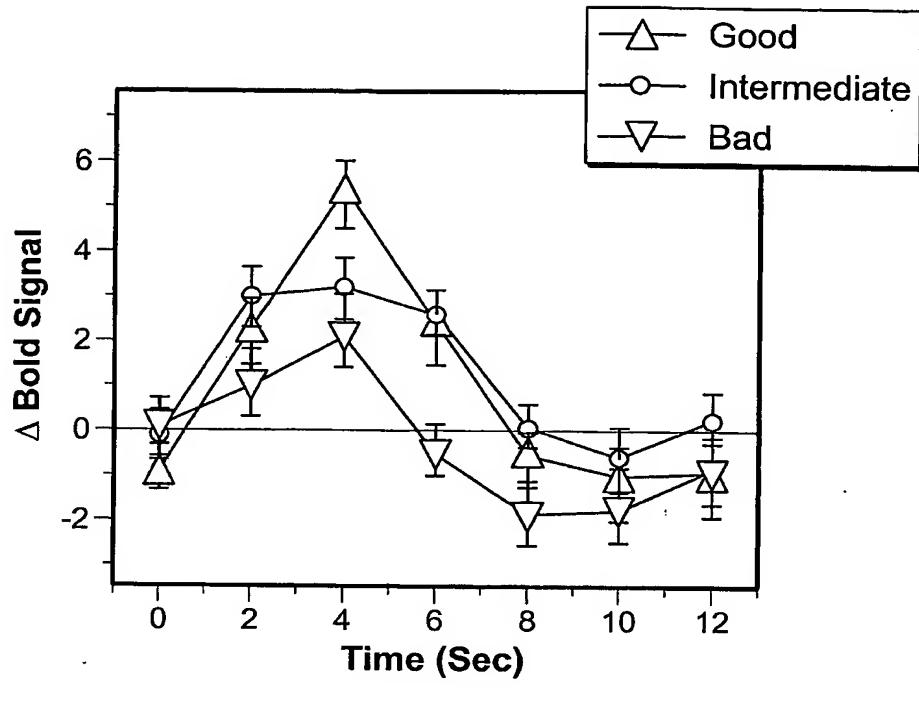


FIG. 9A

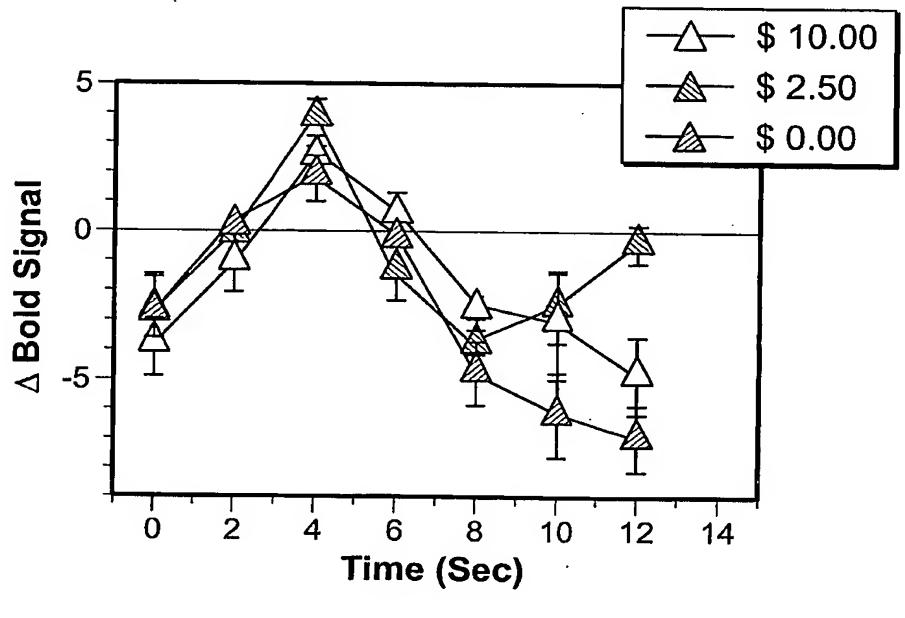
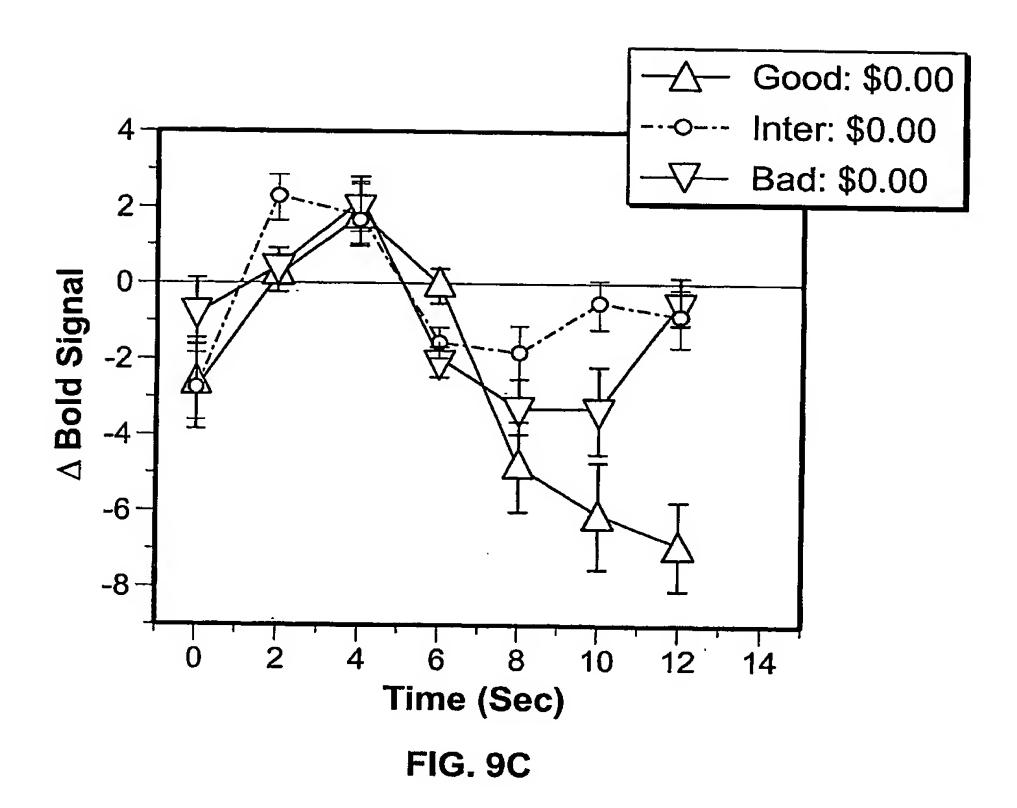
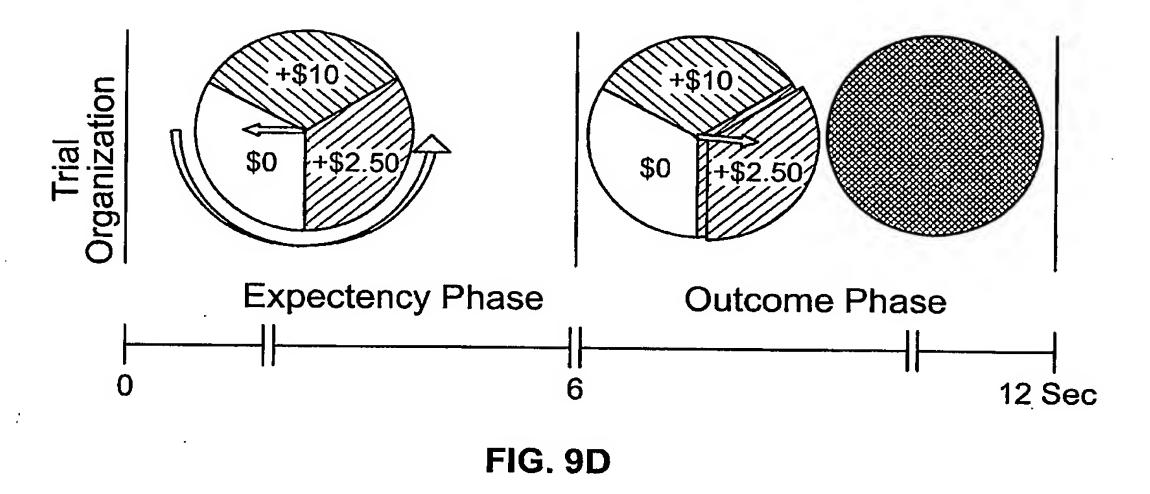


FIG. 9B

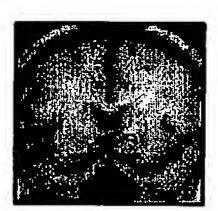




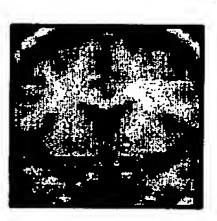
WO 2005/020788

Region         Cocaine         Monetary Reward Reward         Region         Cocaine         Monetary Reward Reward         Beau           GOb         R         (1)         (2)         (4)         (4)           GOb         R         (X)         X         X         (X)           NAc         R         (X)         X         X         (X)           SLEA         R         (X)         X         (X)         (X)           Amygdala R         R         (X)         X         (X)         (X)           VT         R         (X)         X         (X)         (X)           VT         R         (X)         X         (X)         (X)           YT         R         (X)         X         (X)         (X)           YT         R         (X)         X         (X)         (X)           YT         R         X         X         (X)         (X)         (X)           YT         R         X         X         (X)         (X)         (X)         (X)           YT         R         X         X         (X)         (X)         (X)         (X)         (X)		Expectancy					Outcomes	9			
Color   Colo	Region	Cocaine	<b>Monetary</b> Reward	Region	Coca	ine	Monetary Reward	Beauty		Pain	_
Cob   R   X   X   X   X   X   X   X   X   X					豆	(2)		( <del>-</del> )	7	( <del>+</del> )	Image: Control of the
X					×	×	X3	$(x^2)$		X <sup>2</sup>	
X		X2	x2	۔	×	X	X3				
L         X         X         I         X		×	×		×	×	×		(X)		×
R         X         SLEA         R         (X)         X         X           dala R         X         X         X         X         X           L         X         X         X         X         X           L         X         X         X         X         X           L         X         X         X         X           L         X         X         X         X           L         X         X         X         X	7	×	×	<b>_</b>	×			X	<b>Y</b>		×
Amygdala R			×		(X)	×	X	(X)		×	
R X X X X X X X X X X X X X X X X X X X					×			X	<b>Y</b>		
X X X X X X X X X X X X X X X X X X X					$\widehat{\times}$	×	×				
ж х х х	_;		×	J	×	1	×	<b>\</b>	<b>X</b>		$\otimes$
X					×	×	×			×	<del></del>
					×	×	1	1	×	×	; ; ;

FIG. 10A



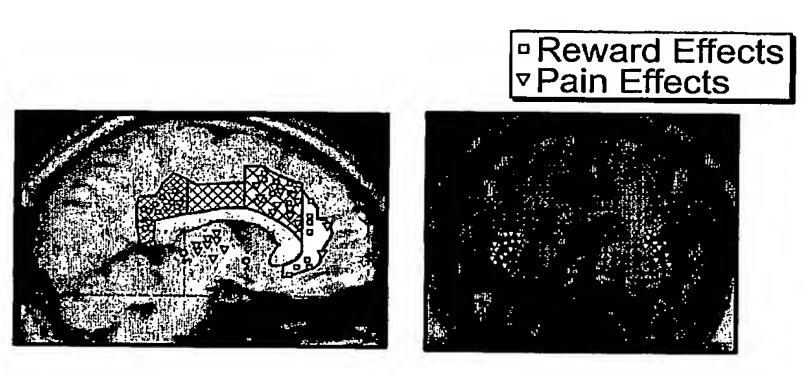
Monetary Expectancy



Cocaine Expectancy

FIG. 10B

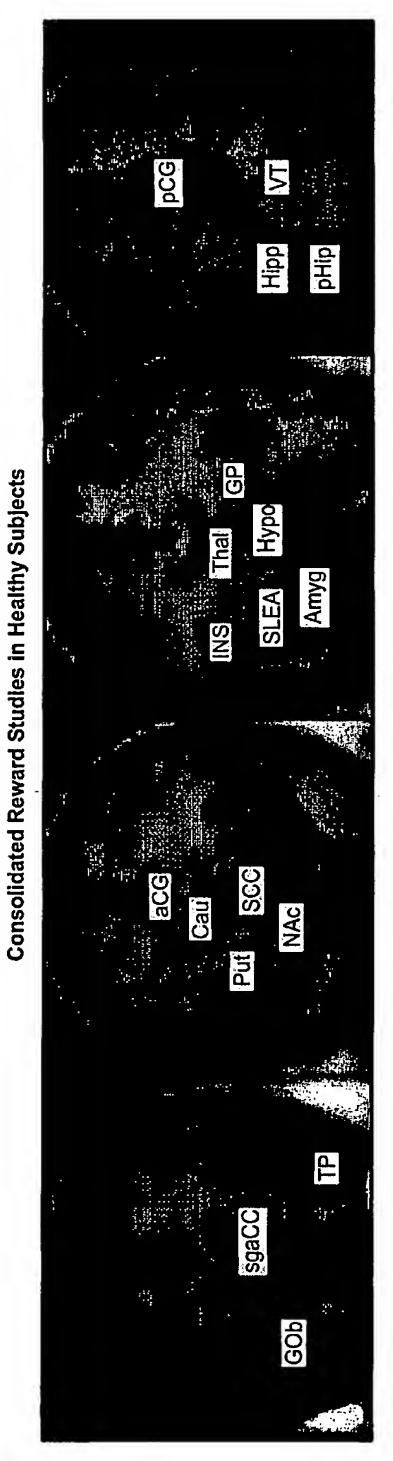
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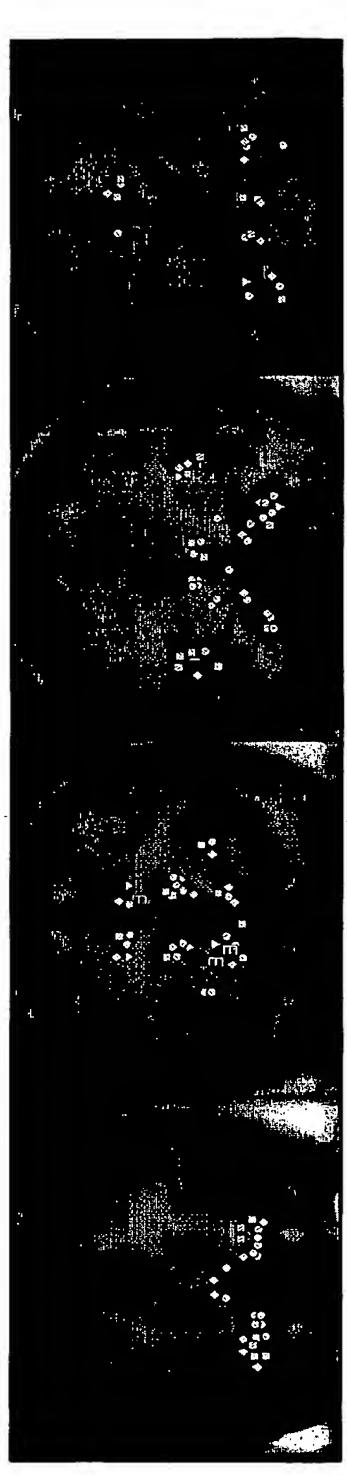


Reward and Pain in aCG, INS, Thal FIG. 10C

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Monetary Reward Guessing Paradigm	Appetative Reward  Passive Fluid/Chocolate	Social-Aesthetic Reward  Passive Viewing Beauty	Drug Reward  Passive Inf Amphetamine	Probability Paradigms  3 Cognitive Tasks Focussed
Performance Task	₪ Passive Taste	<ul> <li>Passive Viewing Loved Face</li> <li>Passive Listening Music</li> </ul>	∇ Passive Inf Procaine	On Probability Assessment

FIG. 11

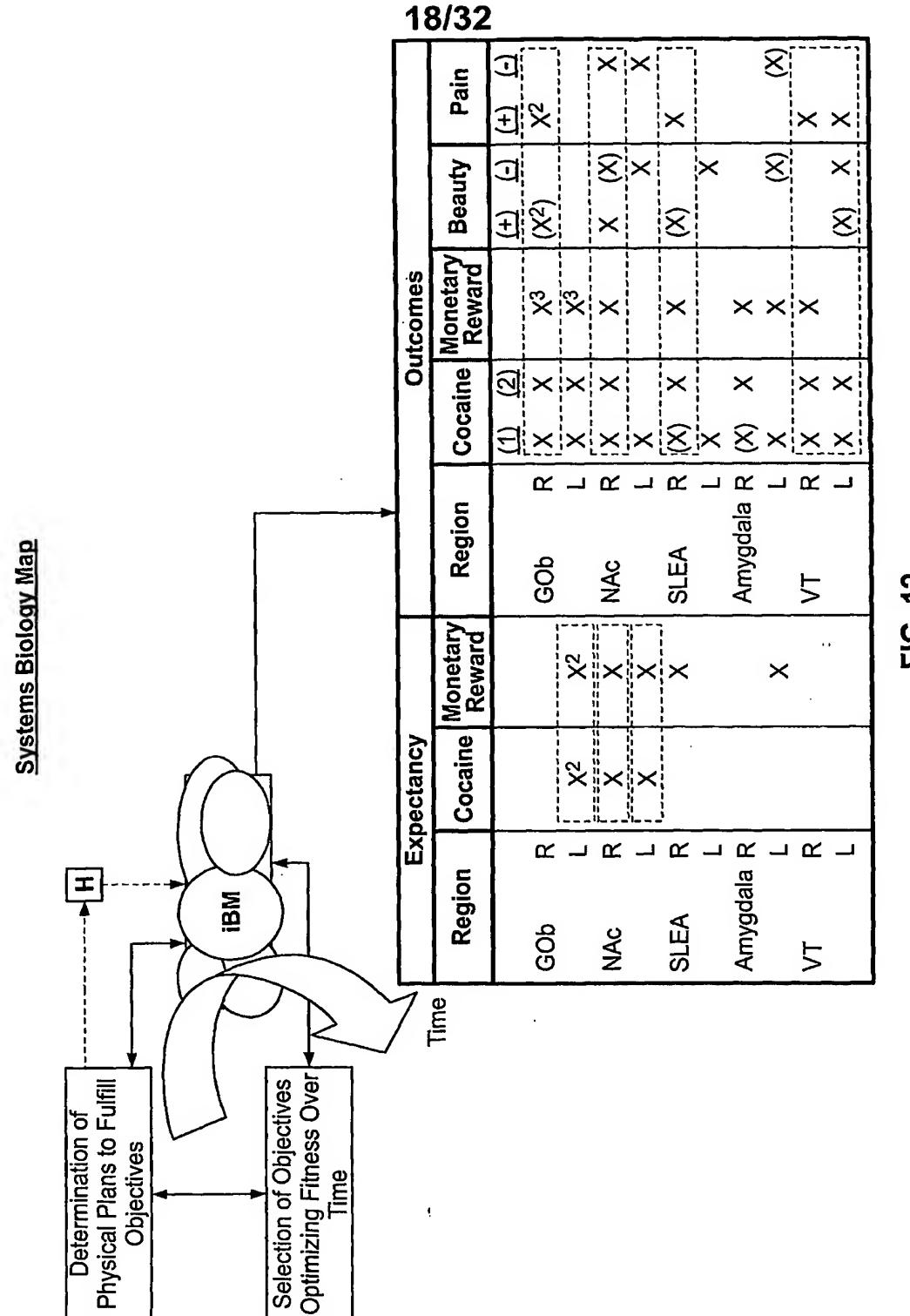
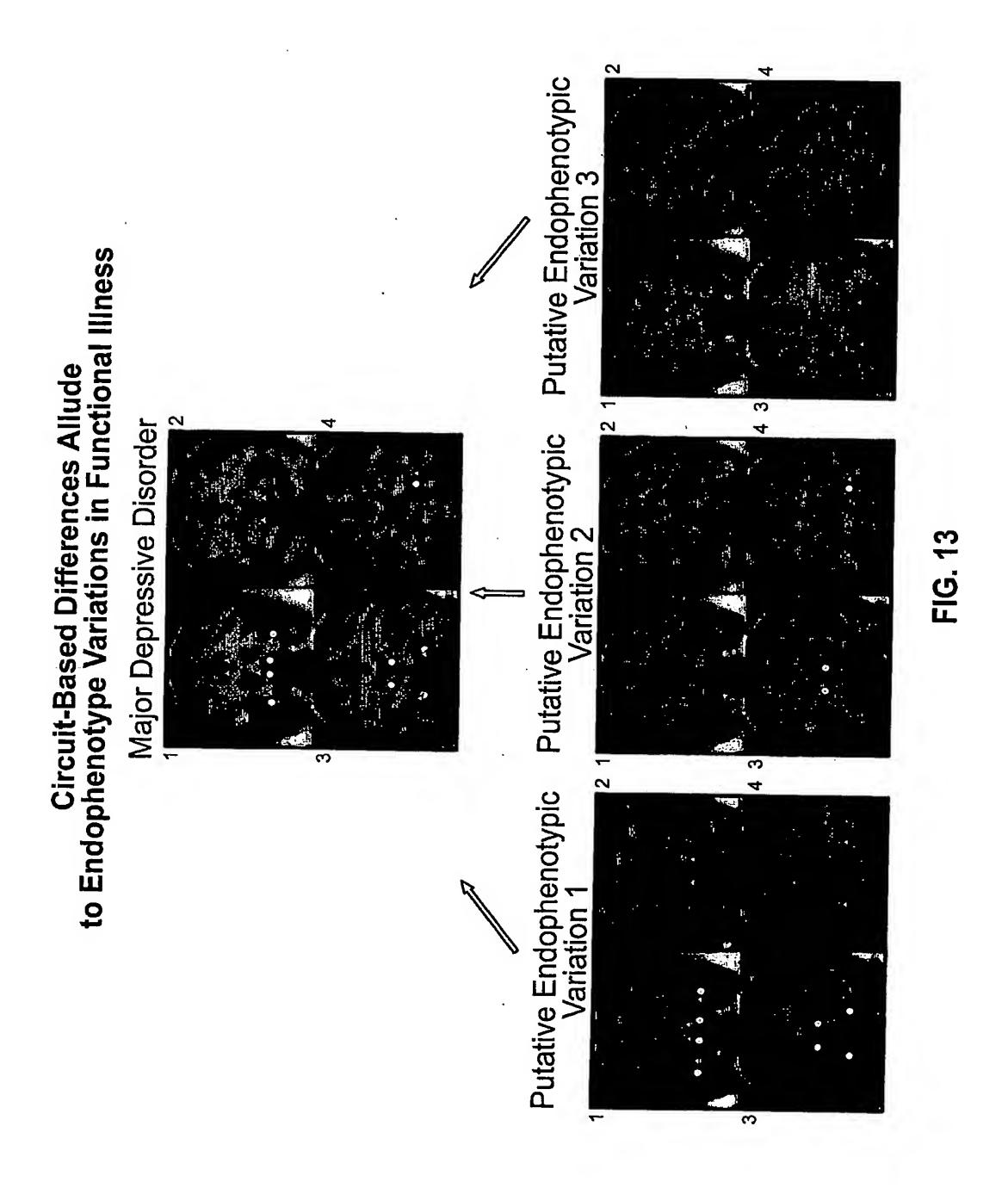
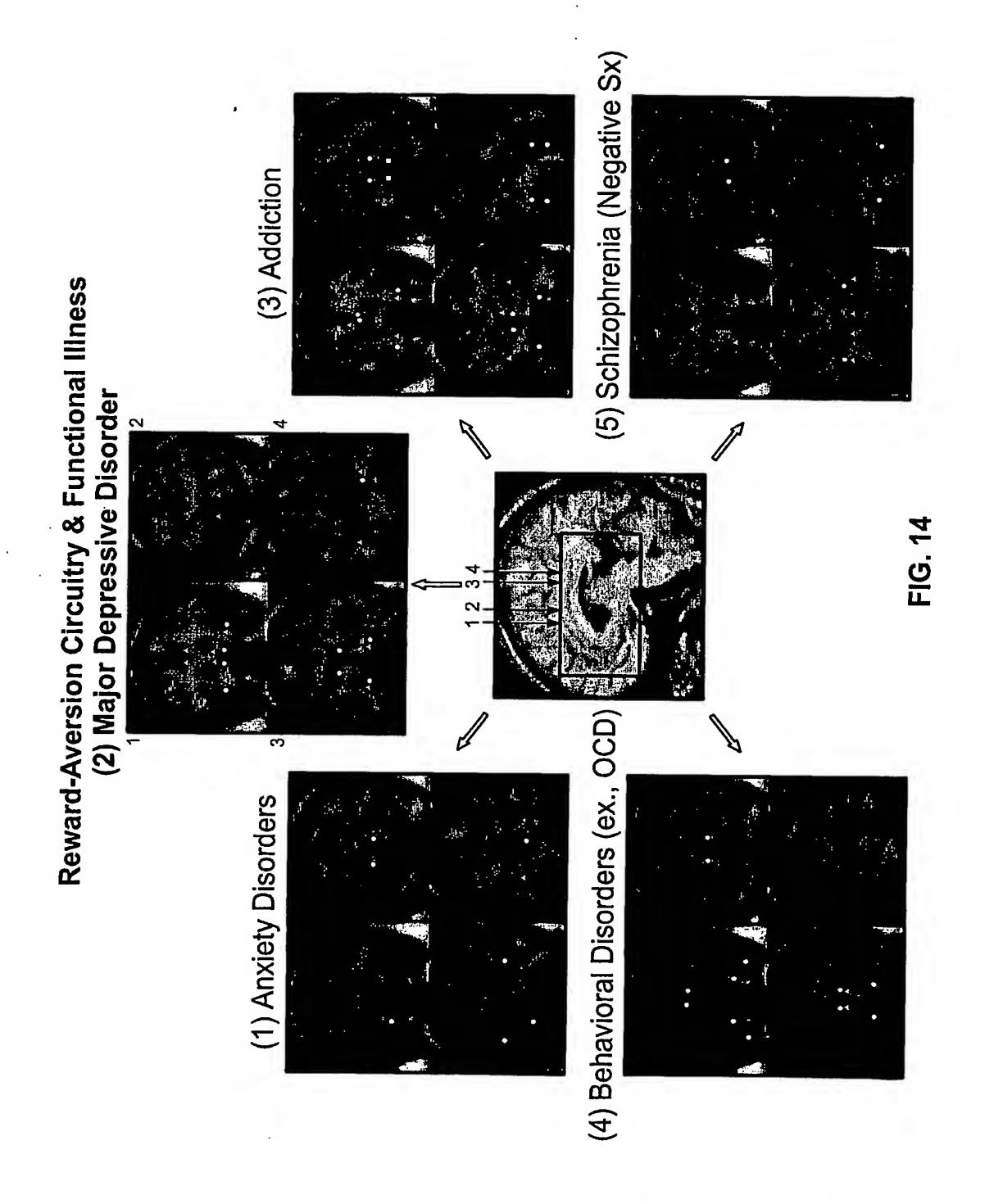


FIG. 12





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Top-Down Approach (Phenotype to Genotype):

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\ No Clinical \ Manifestations Potential to Identify All Polymorphic Traits and Temporal Adaptations for a Behavioral Variant (N+1) Endophenotype (N+2) Circuit EnPh(N+1) = Endophenotype EnPh6 EnPh5 Other Illness **Behavior N** EnPh(N+2) =Circuit N\* EnPh4 Metric Traits that Segregate with Illness Phenotype Category of Illness (i.e., Major Depressive Disorder) Behavior B EnPh3 Circuit 2\* EnPh2 EnPh(N-1) = Endophenotype (N) **Behavior A** EnPh1 = Endophenotype 1 EnPh2 = Endophenotype 2 Circuit 1\* EnPh1( phenotype phenotype Endo-EXO.

FIG. 15

Other Extreme of Molecular Function Endophenotype 2 Association of Polymorphism with Endophenotypes **Bottom-Up Approach:** Genetic Polymorphism FIG. 16 One Extreme of Molecular Function Endophenotype 1

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210-Begin **~211** fMRI Evaluation of Paradigm I -212 fMRI Evaluation of Paradigm II -214 Map Dataset to Anatomical Model -216 Condense Information into a Quantitative Systems Biology Map (QSBM) **218** Record Information in a Database of QSBMs

FIG. 17

End

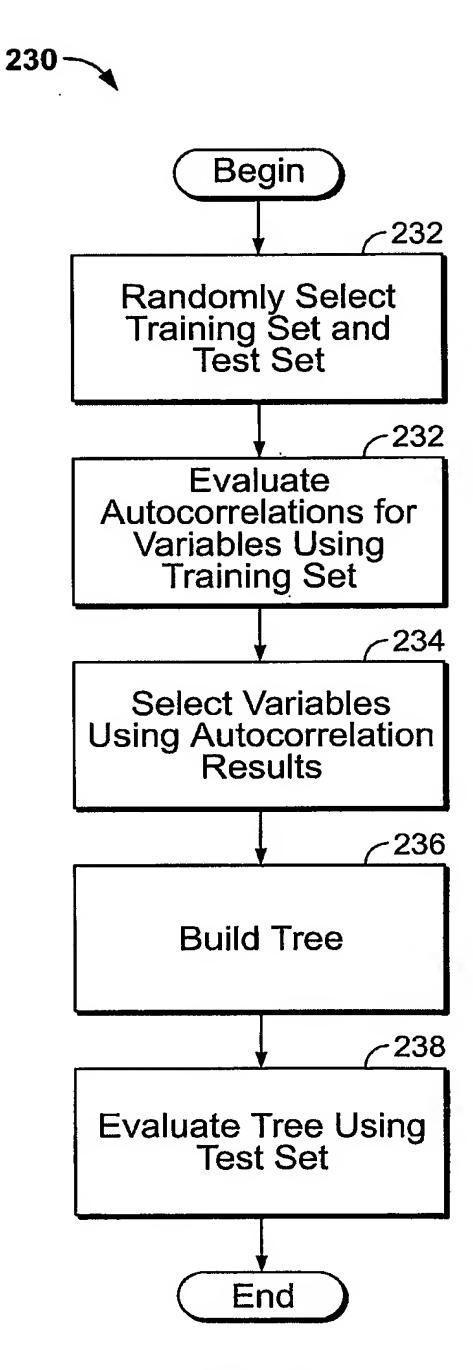
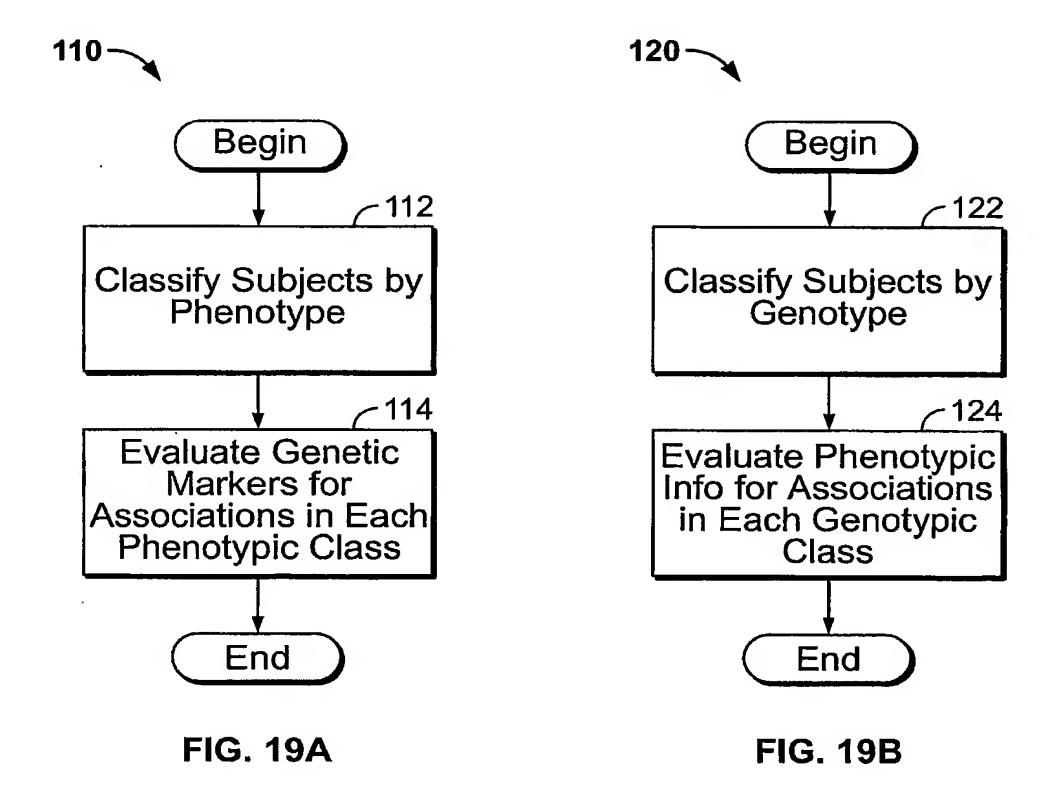


FIG. 18



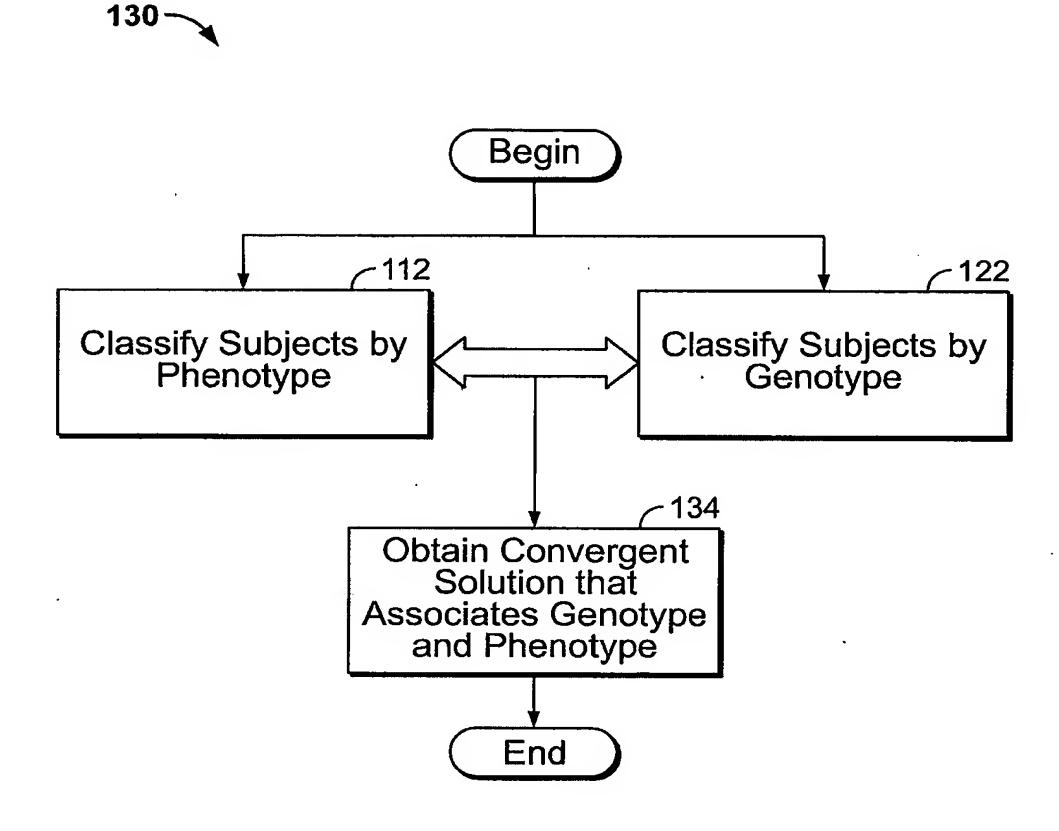


FIG. 19C

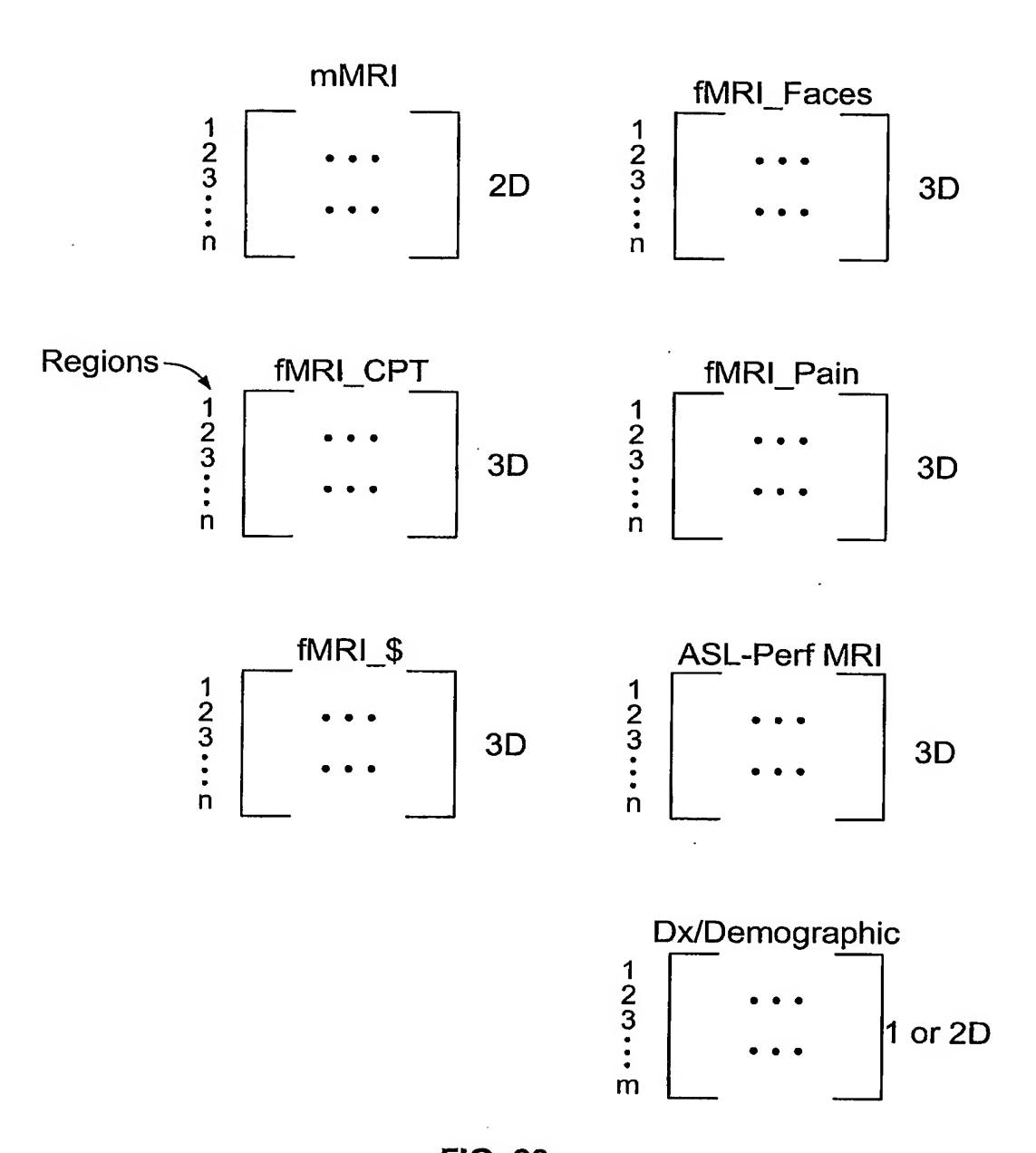


FIG. 20

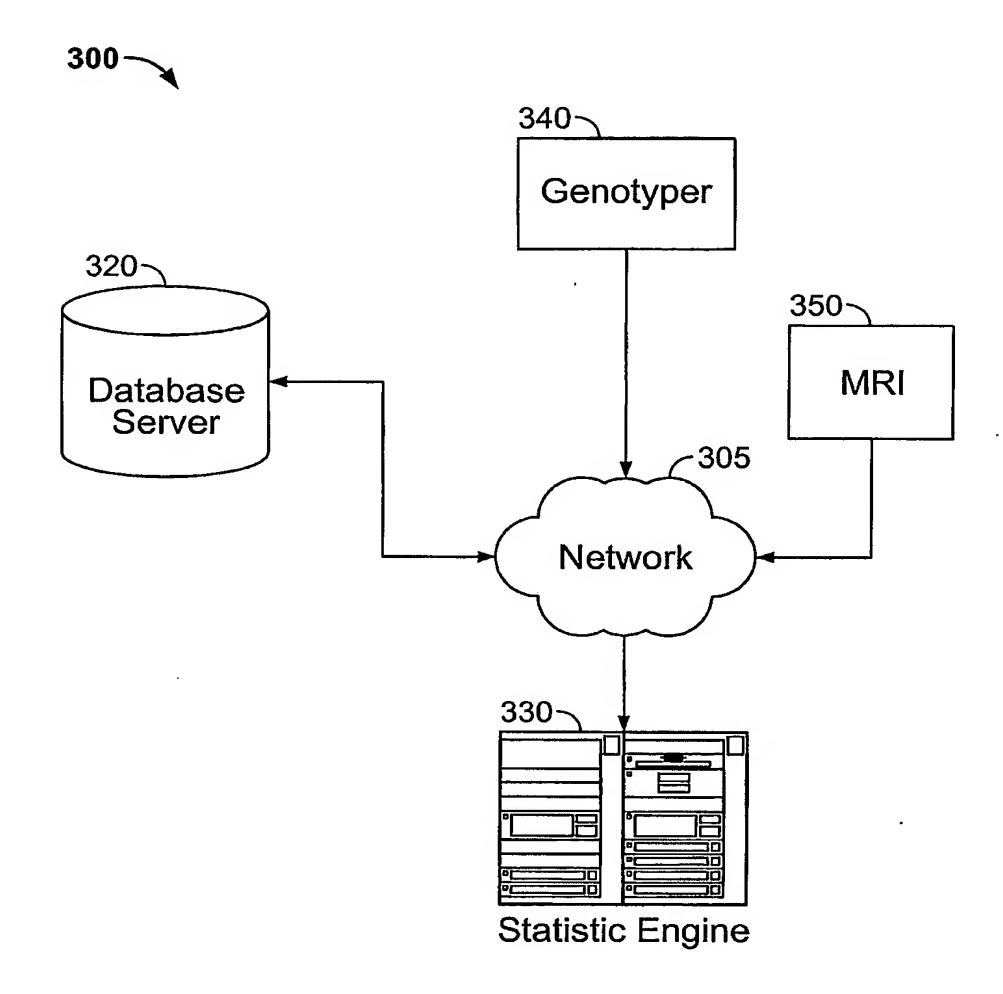
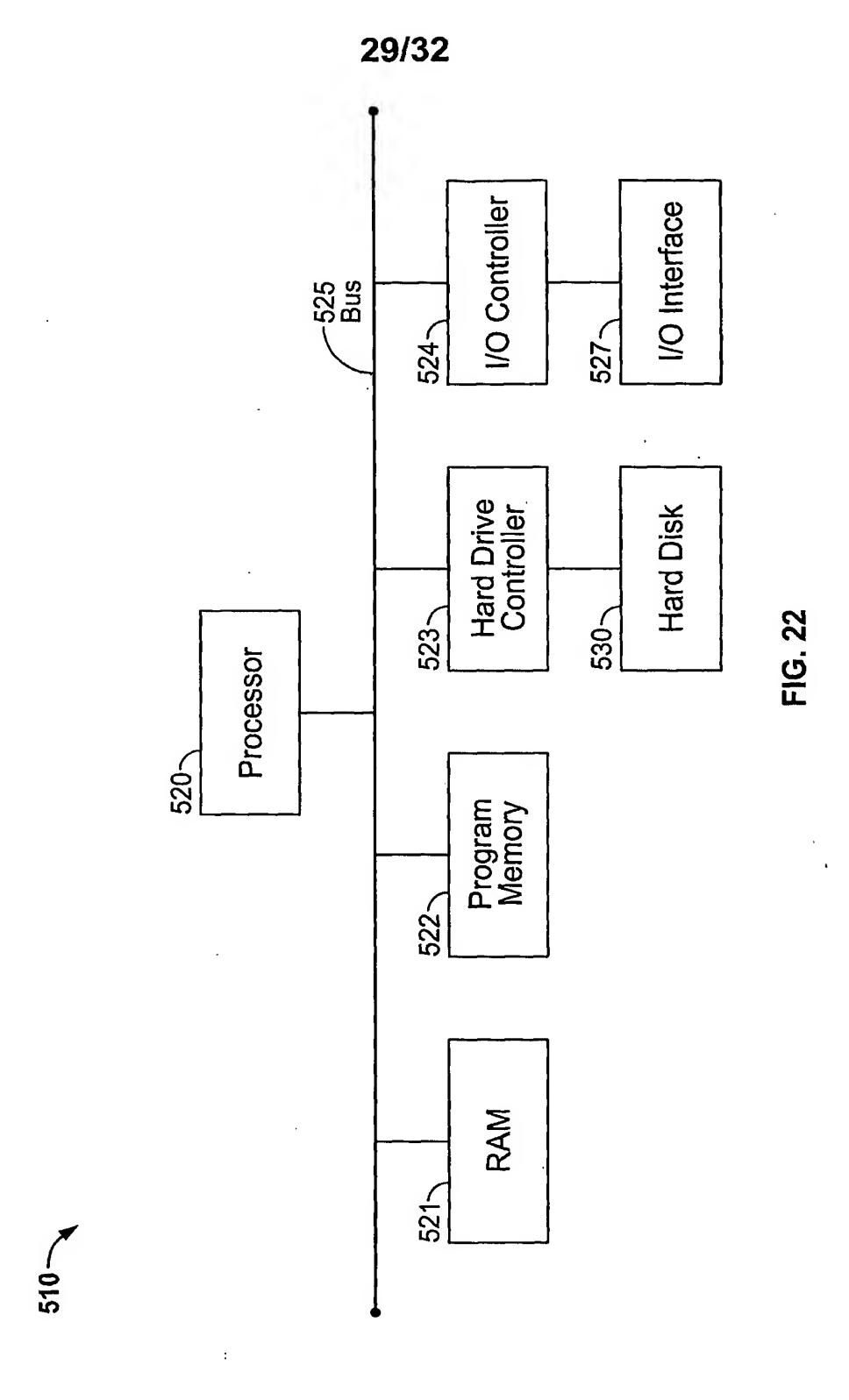
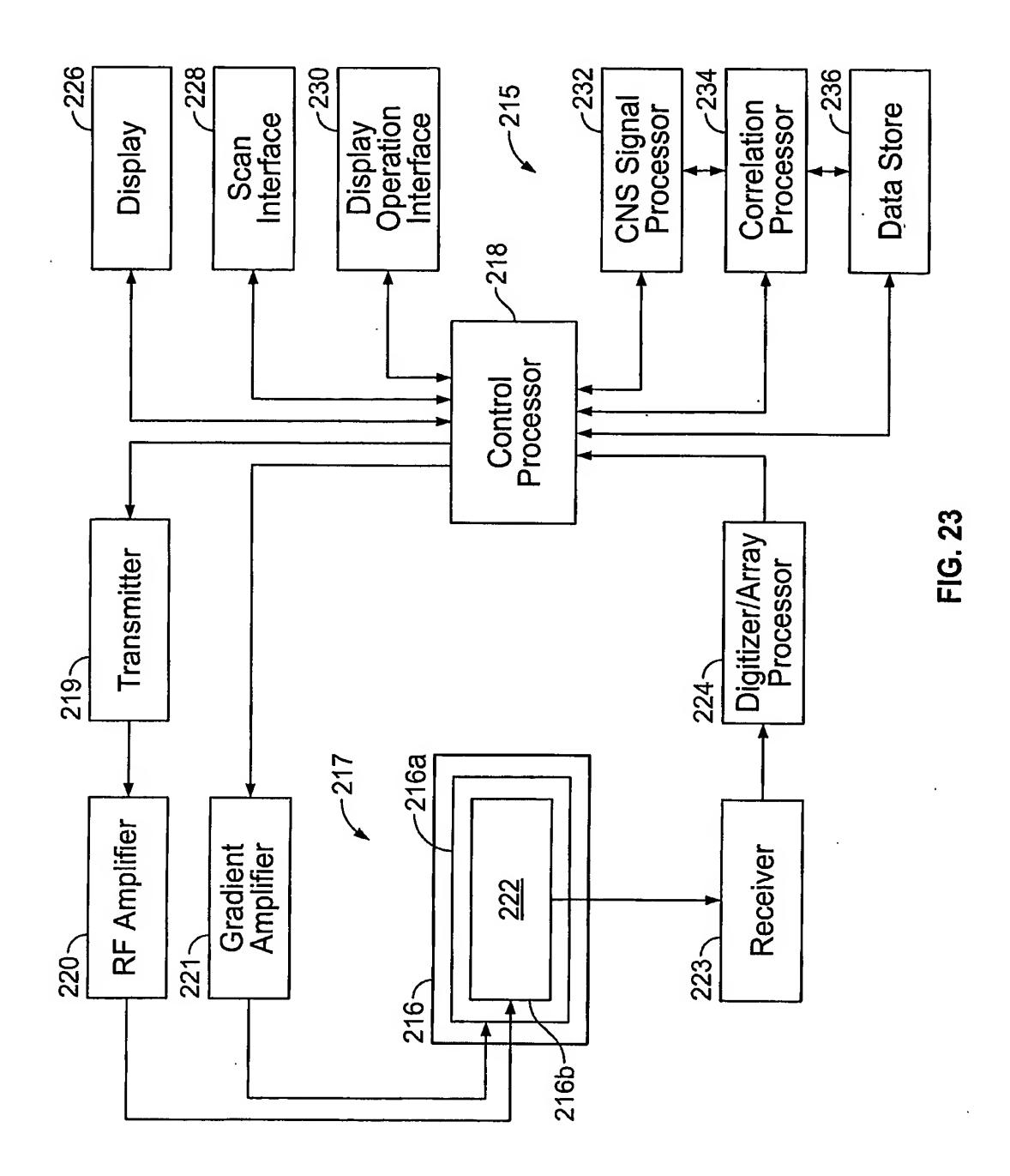
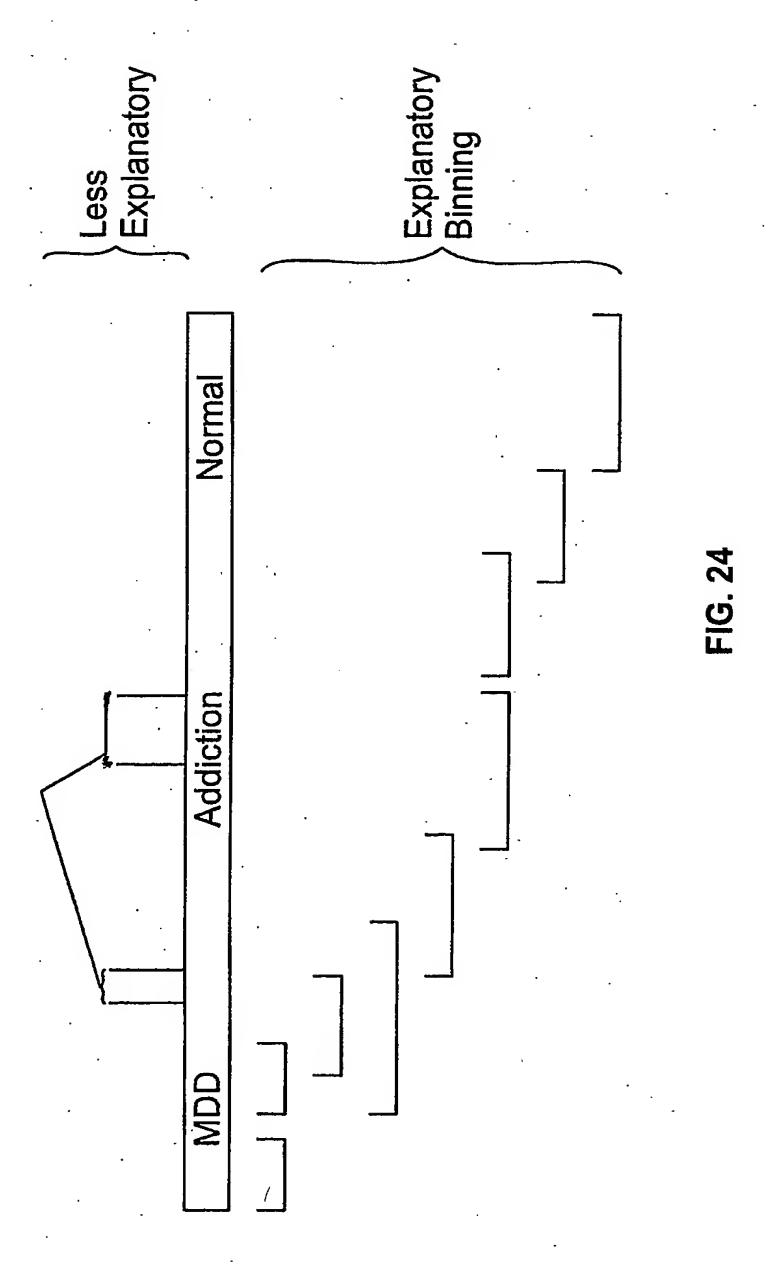


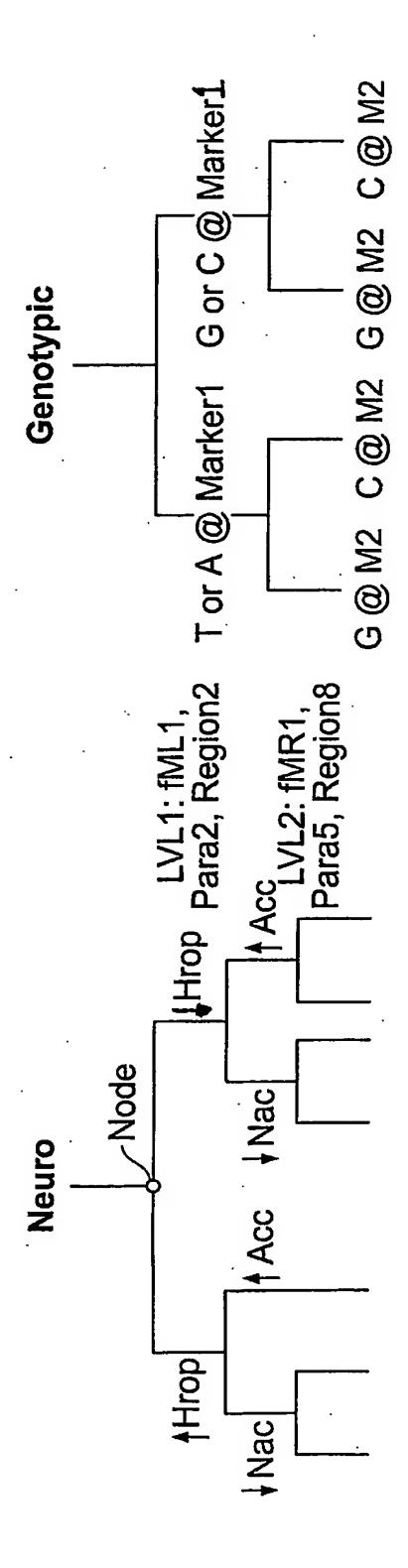
FIG. 21



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16.25